

Effect of Sr/Ti Ratio on the Photocatalytic Properties of SrTiO₃

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Abstract	<p>Since strontium titanate is a wide gap semiconductor, it requires UV light to generate the photocatalytic activities. Modification of strontium titanate to show photocatalytic activity under visible light irradiation is the essential work to efficiently utilize the sun light energy for environmental application. It is expected that the synthesis of SrTiO₃ with variation of Sr/Ti atomic ratio could induce the defect crystals having unique photocatalytic properties. The SrTiO₃ with various Sr/Ti atomic ratios were synthesized by microwave-assisted solvothermal reaction of SrCl₂ center dot 6H₂O and Ti(OC₃H₇)₄ in KOH aqueous solutions with different atomic ratios of Sr/Ti. The products were characterized by TG-DTA, XRD and DRS. The photocatalytic activity was determined by DeNO(x) ability using LED lamps with the wavelengths of 627 nm (red), 530 nm (green), 445 nm (blue) and 390 nm (UV). The nanoparticles of perovskite type SrTiO₃ with the particle size of 30-40 nm were successfully synthesized. The visible light responsive photocatalytic activity was generated by adding excess amount of Sr. The photocatalytic activity in visible light could be enhanced by an increase in the Sr/Ti atomic ratio up to 1.25, indicating that the visible light responsive photocatalytic activity is due to the generation of new band gap between the conduction band and valence band of SrTiO₃ by the formation of oxygen vacancy.</p>
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